

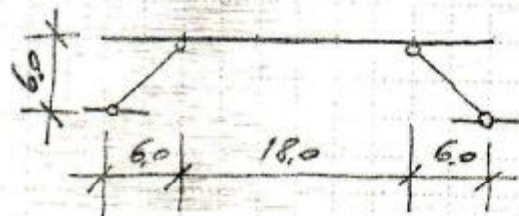
ZA KONSTRUKCIJU MOSTA PREMA SKICI POTREBNO JE:

1. DIMENZIONISATI PLOČU POS 1 U KARAKTERISTIČNIM PRESECIMA. SKICIRATI RASPORED ARMATURE U PLOČI
2. IZVRŠITI ANALIZU OPTEREĆENJA I NACRTATI DIJAGRAME STATIČKIH UTICAJA ZA POS 3. I POS 5.
3. DIMENZIONISATI POS 3 U PRESECIMA 1-1, 2-2 I 3-3 PREMA SRAČUNATIM UTICAJIMA. SKICIRATI PLAN ARMATURE.
4. DIMENZIONISATI STUB POS 5 UZIMAJUĆI U OBZIR VITKOST. DIMENZIJE STUBA SU $40/d = ?$ cm
5. SRAČUNATI RAZMAK I ŠIRINU PRSUNA ZA NOSAČ POS 3 U PRESEK 3-3.

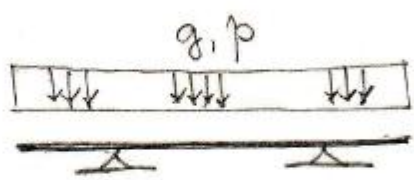
PODACI

MB 30
RA 400/500
 $p = 5,0 \text{ KN/m}^2$
POS 2: $b = 30 \text{ cm}$.

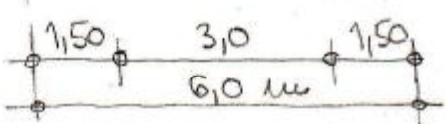
STATIČKI SISTEM



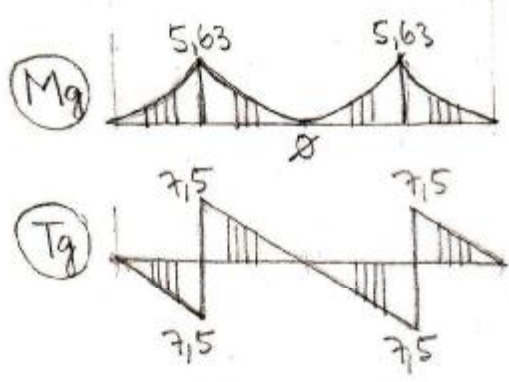
POS 1 - ПЛОЧА



$$q = 0,20 \cdot 25,0 = 5,0 \text{ kN/m}^2$$
$$p = 5,0 \text{ kN/m}^2$$



$$M_g^0 = M_p^0 = 5,0 \cdot 1,50^2 / 2 = 5,63 \text{ kNm/m}^1$$
$$M_g^p = M_p^p = 5,0 \cdot \left(\frac{3,0^2}{8} - \frac{1,5^2}{2} \right) = 0$$



$$R_g = R_p = 5,0 \cdot 6,0 / 2 = 15,0 \text{ kN/m}^1$$
$$T_g^l = T_p^l = 5,0 \cdot 1,50 = 7,5 \text{ kN/m}^1$$

MB 30 \rightarrow $f_b = 20,5 \text{ MPa}$
RA 400/500

$$M_g \equiv M_p ; T_g \equiv T_p$$

$$b/d/h = 100/20/17 \text{ cm}$$

$$M_u = 1,6 \cdot 5,63 + 1,8 \cdot 5,63 = 19,13 \text{ kNm/m}^1$$

$$k = \frac{17,0}{\sqrt{\frac{19,13}{2,05}}} = 5,566 \rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 0,925 / 10\% \\ \mu = 3,312\% \end{cases}$$

$$A_a = 3,312 \cdot 17,0 \cdot \frac{2,05}{40,0} = 2,89 \text{ cm}^2/\text{m}^1$$

$$\text{min } A_a = 0,10 \cdot 20,0 = 2,0 \text{ cm}^2/\text{m}^1$$

УСВОЈЕНО $\boxed{R\phi 8/15}$ (3,35 cm²/m¹)

$$A_{ap} = 0,2 \cdot 2,89 = 0,58 \text{ cm}^2/\text{m}^1$$

$$\text{min } A_{ap} = 0,085 \cdot 20,0 = 1,70 \text{ cm}^2/\text{m}^1$$

УСВОЈЕНО $\boxed{R\phi 8/25}$ (2,01 cm²/m¹)

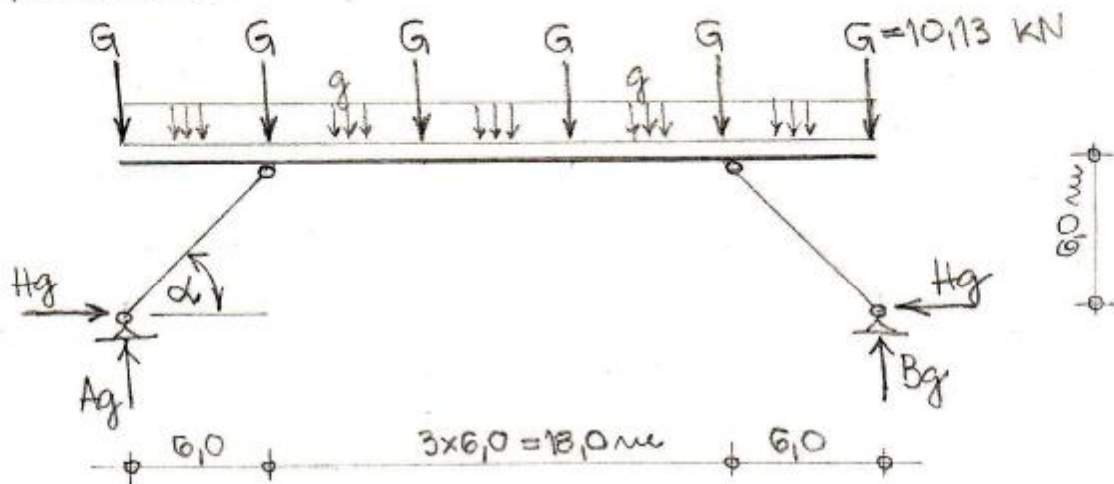
$$T_u = 1,6 \cdot 7,50 + 1,8 \cdot 7,50 = 25,5 \text{ kN/m}^1$$

$$T_{tr} = \frac{25,50}{100,0 \cdot 0,9 \cdot 17,0} = 0,017 \text{ kN/cm}^2 < T_c = 0,11 \text{ kN/cm}^2$$

НИЈЕ ПОТРЕБНО ОСИГУРАЊЕ АРМАТУРОМ.

POS 3, POS 5

a) СТАЛНО ОПТЕРЕТЕЊЕ



- СОПСТВЕНА ТЕЖИНА POS 3: $(1,20 - 0,20) \cdot 0,30 \cdot 25,0 = 7,5 \text{ kN/m}'$
 - ОД ПЛОЧЕ POS 1 $R_{g1} = 15,0 \text{ kN/m}'$

$$g = 22,5 \text{ kN/m}'$$

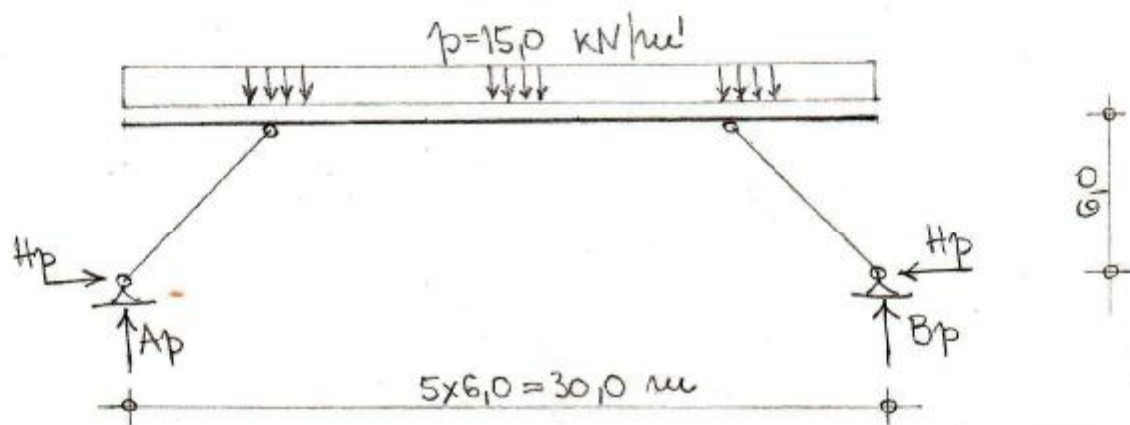
- ОД POS 2: $G = (1,20 - 0,20) \cdot 0,30 \cdot 25,0 \cdot 2,70 / 2 = 10,13 \text{ kN}$

$$G = 10,13 \text{ kN}$$

$$A_g = B_g = \frac{1}{2} \cdot [30,0 \cdot 22,5 + 6 \cdot 10,13] = 367,88 \text{ kN}$$

$$H_g = A_g \cdot \text{ctg } \alpha = A_g \cdot \text{ctg } 45^\circ = 367,88 \text{ kN}$$

б) КОРИСНО ОПТЕРЕТЕЊЕ

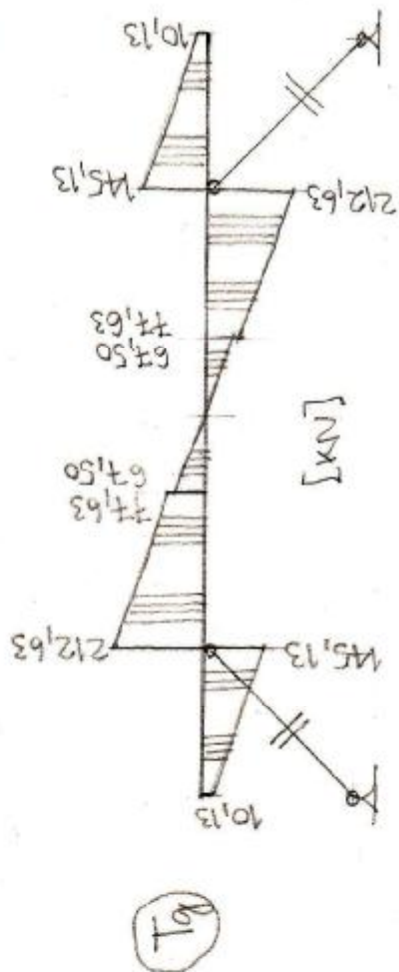
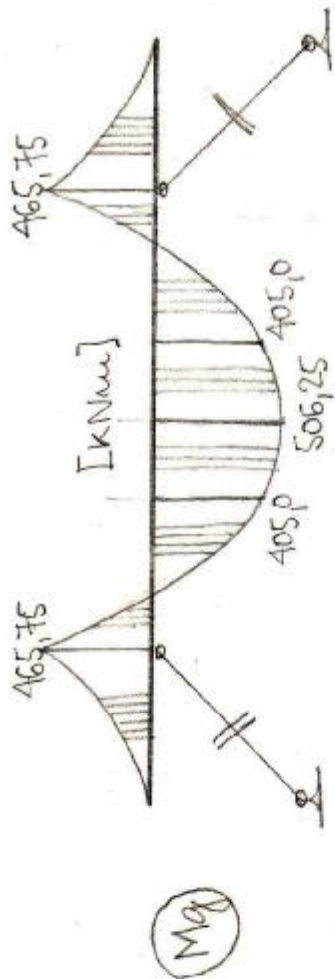


- ОД ПЛОЧЕ POS 1: $R_{p1} = 15,0 \text{ kN/m}' \rightarrow p = 15,0 \text{ kN/m}'$

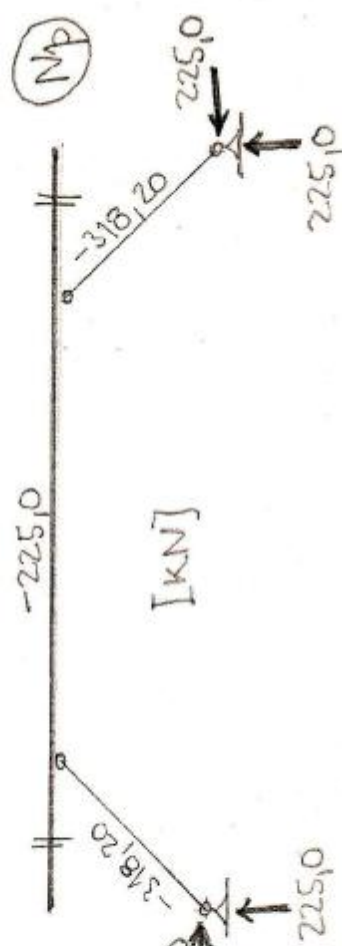
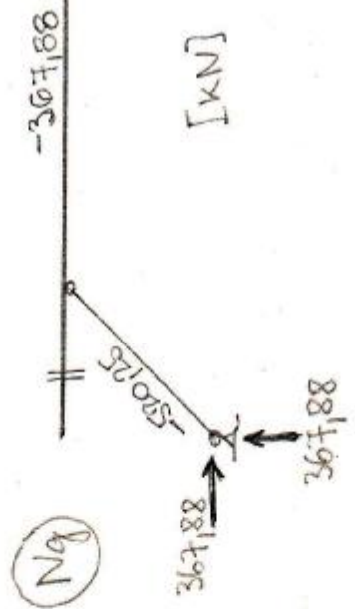
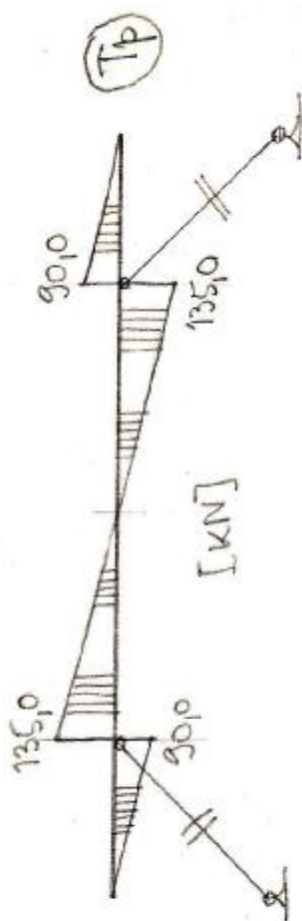
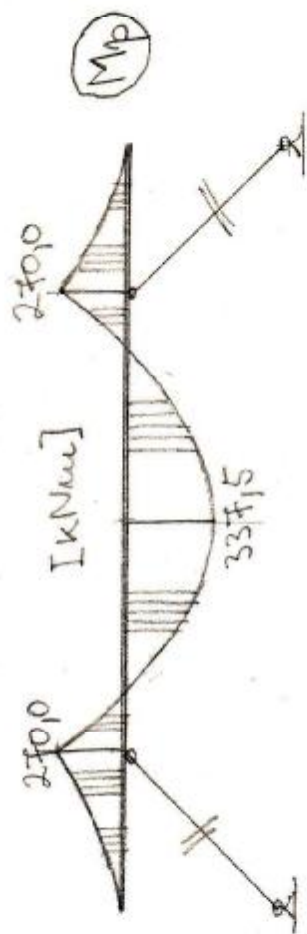
$$A_p = B_p = \frac{1}{2} \cdot (15,0 \cdot 30,0) = 225,0 \text{ kN}$$

$$H_p = A_p \cdot \text{ctg } 45^\circ = 225,0 \text{ kN}$$

а) СТАНО ОНТЕРЕТЕНИЕ



б) КОРИЧНО ОНТЕРЕТЕНИЕ



ДИМЕНЗИОНИСАЊЕ

4.

ПРЕСЕК 1-1

$$M_u = 1,6 \cdot 465,75 + 1,8 \cdot 270,0 = 1231,2 \text{ kNm}$$

$$b/d/h = 30/120/112 \text{ cm}$$

$$k = \frac{112,0}{\sqrt{\frac{1231,2}{0,30 \cdot 2,05}}} = 2,503 \longrightarrow \begin{aligned} \epsilon_b/\epsilon_a &= 2,925/10\% \\ \bar{\mu} &= 17,473\% \end{aligned}$$

$$A_a = 17,473 \cdot \frac{30,0 \cdot 112,0}{100} \cdot \frac{2,05}{40,0} = 30,09 \text{ cm}^2$$

УСВОЈЕНО $\boxed{8R\phi 22}$ (30,41 cm²)

ПРЕСЕК 2-2

$$M_u = 1231,2 \text{ kNm}$$

$$N_u = 1,6 \cdot 367,88 + 1,8 \cdot 225,0 = 993,6 \text{ kN}$$

$$b/d/h = 30/120/112 \text{ cm}$$

$$M_{au} = 1231,2 + 993,6 \cdot \left(\frac{120}{2} - 0,08\right) = 1747,9 \text{ kNm}$$

$$k = \frac{112,0}{\sqrt{\frac{1747,9}{0,30 \cdot 2,05}}} = 2,101 \longrightarrow \begin{aligned} \epsilon_b/\epsilon_a &= 3,5/7,30\% \\ \bar{\mu} &= 26,234\% \end{aligned}$$

$$A_a = 26,234 \cdot \frac{30,0 \cdot 112,0}{100} \cdot \frac{2,05}{40,0} - \frac{993,6}{40,0} = 20,34 \text{ cm}^2$$

УСВОЈЕНО $\boxed{8R\phi 22}$ (30,41 cm²)

(МЕРОДАВАЊ ЈЕ ПРЕСЕК 1-1)

ПРЕСЕК 3-3

$$B = \min \left\{ \begin{aligned} 30 + 20 \cdot 20,0 &= 430 \text{ cm} \\ 30 + 0,25 \cdot 0,7 \cdot 1800 &= 345 \text{ cm} \\ 600/2 &= 300 \text{ cm} \end{aligned} \right\} = 300 \text{ cm}$$

$$M_u = 1,6 \cdot 506,25 + 1,8 \cdot 337,5 = 1417,5 \text{ kNm}$$

$$N_u = 993,6 \text{ kN}$$

$$b/d/h = 300/120/112 \text{ cm}$$

$$M_{au} = 1417,5 + 993,6 \cdot \left(\frac{120}{2} - 0,08\right) = 1934,2 \text{ kNm}$$

$$k = \frac{112,0}{\sqrt{\frac{1934,2 \cdot 10^2}{300,0 \cdot 2,05}}} = 6,316 \longrightarrow \begin{aligned} \epsilon_b/\epsilon_a &= 0,8/10\% \\ \delta &= 0,074 \\ \bar{\mu} &= 2,568\% \end{aligned}$$

$$s \cdot r_v = 0,074 \cdot 112,0 = 8,3 \text{ см} < d_p = 20,0 \text{ см}$$

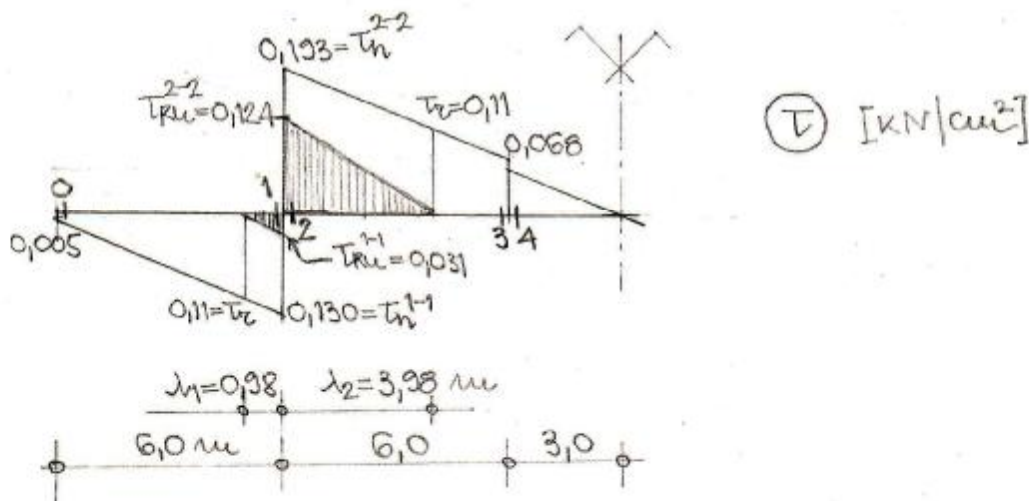
НЕУТРАЛНА ЛИНИЈА СЕ НАЛАЗИ У ПЛОЧИ.

$$A_a = 2,568 \cdot \frac{300,0 \cdot 112,0}{100} \cdot \frac{2,05}{40,0} - \frac{993,6}{40,0} = 19,38 \text{ см}^2$$

УСВОЈЕНО GRØ22 (22,81 см²)

КОНТРОЛА ГЛАВНИХ НАПОНА ЗАТЕЗАЊА

$$z_b = 0,9 \cdot r_v = 0,9 \cdot 112,0 = 100,8 \text{ см} = \text{CONST.}$$



$$T_u^{2-2} = 1,6 \cdot 212,63 + 1,8 \cdot 135,0 = 583,2 \text{ KN}$$

$$T_n^{2-2} = \frac{583,2}{30,0 \cdot 100,8} = 0,193 \text{ KN/cm}^2 > T_c = 0,11 \text{ KN/cm}^2 < 3T_c$$

$$T_{Rw}^{2-2} = \frac{3}{2} \cdot (0,193 - 0,11) = 0,124 \text{ KN/cm}^2$$

УСВАЈАМО URØ8 (a_{ue}⁽¹⁾ = 0,503 см²); α_r = 90°; θ = 45°; m = 2:

$$e_u \leq \frac{m \cdot a_{ue}^{(1)}}{b \cdot T_{Rw}^{2-2}} \cdot \sigma_v = \frac{2 \cdot 0,503}{30,0 \cdot 0,124} \cdot 40,0 = 10,79 \text{ см}$$

УСВОЈЕНО URØ8/10 (m=2)

$$\mu_{\text{mez.}} = \frac{2 \cdot 0,503}{30,0 \cdot 10,0} = 0,335\% > 0,2\% = \text{min. } \mu_{\text{mez.}}$$

$$T_u^{3-3} = 1,6 \cdot 77,63 + 1,8 \cdot 45,0 = 205,2 \text{ KN}$$

$$T_n^{3-3} = \frac{205,2}{30,0 \cdot 100,8} = 0,068 \text{ KN/cm}^2 < T_c$$

$$\lambda_2 = 6,0 \cdot \frac{0,193 - 0,11}{0,193 - 0,068} = 3,98 \text{ м}$$

$$T_{\text{u}}^{1-1} = 1,6 \cdot 145,13 + 1,8 \cdot 90,0 = 394,2 \text{ kN}$$

$$T_{\text{u}}^{1-1} = \frac{394,2}{30,0 \cdot 100,8} = 0,130 \text{ kN/cm}^2 > T_{\text{c}} < 3T_{\text{c}}$$

$$T_{\text{Ru}}^{1-1} = \frac{3}{2} \cdot (0,130 - 0,11) = 0,031 \text{ kN/cm}^2$$

УСВОЈЕНО: URØ8; $m=2$; $\alpha=90^\circ$; $\theta=45^\circ$:

$$e_{\text{u}} \leq \frac{m \cdot a_{\text{u}}^{(1)}}{b \cdot \sin \mu_{\text{uz}}} = \frac{2 \cdot 0,503}{30,0 \cdot 0,2 \cdot 10^{-2}} = 16,76 \text{ cm}$$

УСВОЈЕНО URØ8/15 ($m=2$)

$$T_{\text{u},\mu} = \frac{2 \cdot 0,503}{30,0 \cdot 15,0} \cdot 40,0 = 0,089 \text{ kN/cm}^2 > T_{\text{Ru}}^{1-1} = 0,031 \text{ kN/cm}^2$$

$$T_{\text{u}}^{0-0} = 1,6 \cdot 10,13 = 16,2 \text{ kN}$$

$$T_{\text{u}}^{0-0} = \frac{16,2}{30,0 \cdot 100,8} = 0,005 \text{ kN/cm}^2 < T_{\text{c}}$$

$$\lambda_1 = 6,0 \cdot \frac{0,130 - 0,11}{0,130 - 0,005} = 0,98 \text{ m}$$

POS 5 (ТЕОРИЈА ДОПУШТЕНИХ НАПОНА)

$$N = N_g + N_p = 520,25 + 318,20 = 838,45 \text{ kN}$$

$$l_i = l = 8,48 \text{ m}$$

$$b = 40 \text{ cm} \rightarrow i_b = \frac{b}{\sqrt{12}} = \frac{40}{\sqrt{12}} = 11,55 \text{ cm}$$

$$\lambda_b = \frac{848,0}{11,55} = 73,49 > 50$$

$$\text{MB } 30 \rightarrow \sigma_s = 8,0 \text{ MPa}$$

$$\sigma_k = 1,4 \cdot 8,0 - 0,4 - (8,0 - 1) \cdot \frac{73,49}{125} = 6,69 \text{ MPa} = 0,669 \text{ kN/cm}^2$$

$$\text{MIN. } \mu = \frac{73,49}{50} - 0,4 = 1,07\%$$

$$A_{\text{b, ПОТР.}} = \frac{N}{\sigma_k \cdot (1 + \eta \cdot \mu)} = \frac{838,45}{0,669 \cdot (1 + 10 \cdot 1,07 \cdot 10^{-2})} = 1133,0 \text{ cm}^2$$

$$d \geq \frac{1133,0}{40,0} = 28,33 \text{ cm} \rightarrow \underline{d = 30 \text{ cm}}$$

$$i_{\text{d}} = \frac{30,0}{\sqrt{12}} = 8,66 \text{ cm}$$

$$\lambda_{\text{d}} = \frac{l_i}{i_{\text{d}}} = \frac{848,0}{8,66} = 98,0 > \lambda_b$$

$$\sigma_k = 1,4 \cdot \sigma_s - 0,4 - (\sigma_s - 1) \cdot \frac{\lambda}{125} = 1,4 \cdot 8,0 - 0,4 - (8,0 - 1) \cdot \frac{98,0}{125}$$

$$\sigma_k = 5,31 \text{ MPa} = 0,531 \text{ kN/cm}^2$$

MIN. $\mu = \frac{38,0}{50} - 0,4 = 1,56\%$

ПОТР. $A_B = \frac{838,45}{0,531 \cdot (1 + 10 \cdot 1,56 \cdot 10^{-2})} = 1365,2 \text{ см}^2$

$d \gg \frac{\text{ПОТР. } A_B}{b} = \frac{1365,2}{40,0} = 34,1 \text{ см} > d_v = 30 \text{ см}$ (ПРЕТПОСТАВЛЯЕМО)

У СЛЕДЕЋОЈ ИТЕРАЦИЈИ ПРЕТПОСТАВЉАМО $d = 32 \text{ см}$:

$i_d = \frac{32,0}{\sqrt{12}} = 9,24 \text{ см} \rightarrow \lambda = \frac{848,0}{9,24} = 91,9$

$\sigma_k = 1,4 \cdot 8,0 - 0,4 - (8,0 - 1) \cdot \frac{91,9}{125} = 5,66 \text{ МПа} = 0,566 \text{ кН/см}^2$

MIN. $\mu = \frac{91,9}{50} - 0,4 = 1,437\%$

ПОТР. $A_B = \frac{838,45}{0,566 \cdot (1 + 10 \cdot 1,437 \cdot 10^{-2})} = 1296,1 \text{ см}^2$

$d \gg \frac{1296,1}{40,0} = 32,4 \text{ см} \approx 32,0 \text{ см} = \text{ПРЕТП. } d.$

ПОТР. $A_a = 1,437 \cdot 10^{-2} \cdot 1296,1 = 18,63 \text{ см}^2$

УСВОЈЕНО 8R ϕ 19 (22,68 см²)

$A_i = A_B + m \cdot A_a = 40,0 \cdot 32,0 + 10 \cdot 22,68 = 1506,8 \text{ см}^2$

$\sigma_B = \frac{N}{A_i} = \frac{838,45}{1506,8} = 0,556 \text{ кН/см}^2 = 5,56 \text{ МПа} < \sigma_k = 5,66 \text{ МПа}$

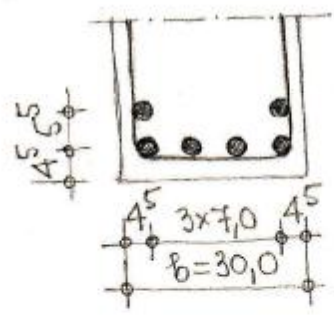
max. $e_u = \text{min.} \left\{ \begin{array}{l} 15 \cdot 1,9 = 28,5 \text{ см} \\ d = 35,0 \text{ см} \\ 30 \text{ см} \end{array} \right\} = 28,5 \text{ см}$

УСВОЈЕНО UR ϕ 8/25

ПОС 2 - ПРОРАЧУН ПРСЛИЦА

$M = M_g + M_p = 506,25 + 337,5 = 843,75 \text{ кНм}$

$N = N_g + N_p = 367,88 + 225,0 = 592,88 \text{ кН}$



$a_1 = (4 \cdot 4,5 + 2 \cdot 10,0) / 6 = 6,33 \text{ см}$

$h_v = 120,0 - 6,33 = 113,67 \text{ см}$

$A_{a1} = 22,81 \text{ см}^2$ (6R ϕ 22)

$A_{a2} = 7,60 \text{ см}^2$ (2R ϕ 22)

$a_2 = 4,5 \text{ см}$

$d_2 = \frac{a_2}{h_v} = \frac{4,5}{113,67} = 0,040$

ПРЕТПОСТАВЉАМО ДА СЕ НЕУТРАЛНА ЛИНИЈА НАЛАЗИ У ПЛОЧИ (ПРАВОУГАОНИ ПРЕСЕК ШИРИНЕ $B=300$ см):

8.

$$\mu_1 = \frac{A a_1}{B \cdot h} = \frac{22,81}{300,0 \cdot 113,67} = 0,067\%$$

$$\mu_2 = \frac{A a_2}{B \cdot h} = \frac{7,60}{300,0 \cdot 113,67} = 0,022\%$$

ПОЛОЖАЈ НЕУТРАЛНЕ ЛИНИЈЕ ЗА ПРАВОУГАОНИ ПРЕСЕК ОПТЕРЕЖЕН МОМЕНТОМ САВИЈАЊА И СИЛОМ ПРИТИСКА ДОБИЈА СЕ РЕШАВАЊЕМ ЈЕДНАЧИНЕ ТРЕЋЕГ СТЕПЕНА ОБЛИКА:

$$s^3 + A \cdot s^2 + B \cdot s + C = 0$$

ГДЕ ЈЕ:

$$A = 3 \cdot \left(\frac{e a_1}{h} - 1 \right)$$

$$B = 6n \left(\frac{e a_1}{h} \cdot \mu_1 + \frac{e a_2}{h} \cdot \mu_2 \right)$$

$$C = -6n \cdot \left(\frac{e a_1}{h} \cdot \mu_1 + \frac{e a_2}{h} \cdot \mu_2 \cdot d_2 \right)$$

$$e a_1 = e + h - \frac{d}{2} = \frac{M a}{N}$$

$$e a_2 = e - \frac{d}{2} + a_2$$

$$e = \frac{M}{N} = \frac{843,75}{592,88} \cdot 10^2 = 142,3 \text{ см}$$

$$e a_1 = 142,3 + 113,6 - \frac{120}{2} = 136,0 \text{ см}$$

$$e a_2 = 142,3 - \frac{120,0}{2} + 4,5 = 86,8 \text{ см}$$

$$M a = N \cdot e a_1 = 592,88 \cdot 136,0 \cdot 10^{-2} = 1161,9 \text{ кНсм}$$

$$n = \frac{E_a}{E_b} = \frac{210,0}{31,5} = 6,67$$

$$A = 3 \cdot \left(\frac{136,0}{113,6} - 1 \right) = 2,173$$

$$B = 6 \cdot 6,67 \cdot \left(\frac{136,0}{113,6} \cdot 0,067 + \frac{86,8}{113,6} \cdot 0,022 \right) \cdot 10^{-2} = 0,053$$

$$C = -6 \cdot 6,67 \cdot \left(\frac{136,0}{113,6} \cdot 0,067 + \frac{86,8}{113,6} \cdot 0,022 \cdot 0,040 \right) \cdot 10^{-2} = -0,046$$

$$s^3 + 2,173 \cdot s^2 + 0,053 \cdot s - 0,046 = 0 \rightarrow \boxed{s = 0,131}$$

$$s \cdot h = 0,131 \cdot 113,6 = 14,88 \text{ см} < d_p = 20 \text{ см}$$

ПРЕТПОСТАВКА О ПОЛОЖАЈУ НЕУТРАЛНЕ ЛИНИЈЕ ЈЕ ТАЧНА.

$$J_{Ib} = \frac{s^2}{2} = 0,009$$

$$J_{IIb} = \frac{s^2}{2} \left(1 - \frac{s}{3} \right) = 0,008$$

НАПОНИ У БЕТОНУ И АРМАТУРИ :

9.

$$\sigma_B = \frac{M_a}{b \cdot h^2} \cdot \frac{s}{J_{IB} + n \cdot \rho_2 \cdot (s - d_2)(1 - d_2)}$$

$$\sigma_B = \frac{1161,9 \cdot 10^2}{300,0 \cdot 113,6^2} \cdot \frac{0,131}{0,008 + 6,67 \cdot 0,022 \cdot 10^{-2} \cdot (0,131 - 0,04)(1 - 0,04)} = 0,471 \frac{\text{KN}}{\text{cm}^2}$$

$$\sigma_{a1} = n \cdot \sigma_B \cdot \frac{1-s}{s} = 6,67 \cdot 0,471 \cdot \frac{1-0,131}{0,131} = 20,87 \text{ KN/cm}^2$$

$$\sigma_{a2} = n \cdot \sigma_B \cdot \frac{s-d_2}{s} = 6,67 \cdot 0,471 \cdot \frac{0,131-0,04}{0,131} = 2,19 \text{ KN/cm}^2$$

НАПОН σ_{a1} У ЗАТЕГНУТОЈ АРМАТУРИ МОЖЕМО СРАЧУНАТИ И ПРЕКО ПРИБЛИЖНОГ ИЗРАЗА :

$$\sigma_{a1} \approx \frac{M_a}{0,95 \cdot h \cdot A_{a1}} - \frac{N}{A_{a1}} \quad (\text{зв} \approx 0,95 \cdot h \rightarrow \text{"Т" са } B > 5B)$$

ШТО ДАЈЕ :

$$\sigma_{a1} \approx \frac{1161,9 \cdot 10^2}{0,95 \cdot 113,6 \cdot 22,81} - \frac{592,88}{22,81} = 21,18 \text{ KN/cm}^2$$

ШТО СЕ СВЕГА 1,5% РАЗЛИКУЈЕ ОД ТАЧНОГ РЕШЕЊА.

ОДРЕЂИВАЊЕ МОМЕНТА ПОЈАВЕ ПРСЛИНЕ

$$N = \text{max. } N = 592,88 \text{ KN}$$

$$M^* = ?$$

$$f_{bzs} = f_{bz} = 0,7 \cdot f_{bz\text{ч}} = 0,7 \cdot 2,4 = 1,68 \text{ MPa} = 0,168 \text{ KN/cm}^2$$

$$\frac{M^*}{W_{e1}} - \frac{N}{A_b} = f_{bzs} \rightarrow M^* = \left(f_{bzs} + \frac{N}{A_b} \right) \cdot W_{e1}$$

$$A_b = 30,0 \cdot 120,0 = 3600,0 \text{ cm}^2 = A_{b, \text{REBRA}}$$

$$W_{e1} = \frac{30,0 \cdot 120,0^2}{6} = 72000 \text{ cm}^3 = W_{b, \text{REBRA}}$$

$$M^* = \left(0,168 + \frac{592,88}{3600,0} \right) \cdot 72000 \cdot 10^{-2} = 239,5 \text{ KNm}$$

$$\xi_a = 1 - \beta_1 \cdot \beta_2 \cdot \left(\frac{\sigma_{a1}^*}{\sigma_{a1}} \right)^2 \approx 1 - \beta_1 \cdot \beta_2 \cdot \left(\frac{M^*}{M} \right)^2$$

ГОРЊИ ИЗРАЗ ЈЕ ГРУБА АПРОКСИМАЦИЈА У СЛУЧАЈУ СЛОЖЕНОГ САВИЈАЊА, АЛИ СЕ ПРИХВАТА С ОБЗИРОМ НА ВЕЛИЧИНУ КОЕФИЦИЈЕНТА ξ_a :

$$\left. \begin{array}{l} \beta_1 = 1,0 \text{ (RA 400/500)} \\ \beta_2 = 1,0 \text{ (t=0)} \end{array} \right\} \xi_a = 1 - 1,0 \cdot 1,0 \cdot \left(\frac{239,5}{843,75} \right)^2 = 0,919$$

$$\varepsilon_{a1,SR.} = \xi_a \cdot \frac{b_{a1}}{E_a} = 0,919 \cdot \frac{20,87}{21,0 \cdot 10^3} = 0,914\%$$

10.

СРЕДЊЕ РАСТОЈАЊЕ ПРСЛИЦА

$$a_0 = a - \frac{\phi}{2} = 4,5 - \frac{2,2}{2} = 3,4 \text{ cm}$$

$$e_{\phi} = 7,0 \text{ cm}$$

$$k_1 = 0,4 \quad (RA 400/500)$$

$$k_2 = 0,125$$

$$r_{bz,ef.} = \text{MIN.} \left\{ \begin{array}{l} 4,5 + 5,5 + 7,5 \cdot 2,2 = 26,5 \text{ cm} \\ (r - x)/2 = (113,6 - 14,88)/2 = 49,4 \text{ cm} \end{array} \right\} = 26,5 \text{ cm}$$

$$\mu_{z,ef.} = \frac{A_{a1}}{b_{BR} \cdot r_{bz,ef.}} = \frac{22,81}{30,0 \cdot 26,5} = 2,869\%$$

$$l_{ps} = 2 \cdot \left(3,4 + \frac{7,0}{10} \right) + 0,4 \cdot 0,125 \cdot \frac{2,2}{2,869 \cdot 10^{-2}} = 12,0 \text{ cm}$$

$$\boxed{l_{ps} = 12,0 \text{ cm}}$$

КАРАКТЕРИСТИЧНА ШИРИНА ПРСЛИЦА

$$a_{pk} = 1,7 \cdot \varepsilon_{a1,SR.} \cdot l_{ps}$$

$$a_{pk} = 1,7 \cdot 0,914 \cdot 10^{-3} \cdot 12,0 = 18,7 \cdot 10^{-3} \text{ cm}$$

$$\boxed{a_{pk} = 0,187 \text{ mm}} < a_{ul} = 0,2 \text{ mm}$$